determining a subset of the edges such that each edge in said subset has a trajectory through a corresponding free neighborhood during motion of the modeled object from a current position to a next position and where each such edge's corresponding free neighborhood comprising a tangent zone comprising a region external to the material of the modeled object and bounded by a planar extension of the polygons that join at said edge,

generating a trace of the motion of said subset of edges between said current and said next positions, and

constructing a representation of the swept volume from the generated traces of the motion of said subset of edges.

26) The method of claim 25 wherein:

for each of the position in the series of sequential positions of the modeled object, the method further comprises:

determining a subset of the polygons such that each polygon in said subset has a trajectory through its corresponding free neighborhood during motion of the modeled object from a preceding position to a current position and from the current position to a next position and where each such polygon's free neighborhood comprises a material zone represented by a half sphere, said half sphere comprising a flat face that is planar with said polygon and said half sphere extending interior to the modeled object;

and wherein constructing a representation of the swept volume further comprises bounding the swept volume at each of said current positions by said subset of polygons associated with each such position.

27) The method of claim 26 wherein each of said plurality of polygons ~~is a triangle.~~

28) The method of claim 25 wherein the motion between two consecutive positions of the modeled object is modeled as linear motion.

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29) The method of claim 25 ~~wherein~~ each free neighborhood comprises a region in ~~which motion of the corresponding edge~~ comprises motion on the boundary of the modeled swept volume.

30) The motion of claim 26 wherein the representation of sequential positions of motion comprise rotational and translational representations.

31) A computer system for controlling generation of a swept volume for a model of a real-world object, the system comprising:

a processor operatively interconnected to a memory;

a user input device;

a display; and

a graphical user interface responsive to activation with the user input device by causing a program stored in the memory to be executed by the processor, said program configuring the processor to perform computations whereby:

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a three dimensional polyhedral representation of a computer model of a real-world object is generated, the representation comprising a plurality of polygons joined at their edges,

three dimensional motion of the modeled object is represented with a set of position matrices,

for each of a series of sequential positions of the modeled object as represented by the matrices,

a subset of the edges is determined such that each edge in said subset has a trajectory through a corresponding free neighborhood during motion of the modeled object from a current position to a next position and where each such edge's corresponding free neighborhood comprising a tangent zone comprising a region

external to the material of the modeled object and bounded by a planar extension of the polygons that join at said edge,

traces are generated by the motion of the subset of edges during motion between a current and a next position, and

a representation of the swept volume is constructed from the traces of the subset of edges.

32) The system of claim 31 wherein the program further comprises instructions to perform computations whereby:

for each of the series of sequential positions of the modeled object, the system will determine a subset of the polygons such that each polygon in said subset has a trajectory through its corresponding free neighborhood during motion of the modeled object from a preceding position to a current position and from the current position to a next position and where each such polygon's free neighborhood comprises a material zone represented by a half sphere, said half sphere comprising a flat face that is planar with said polygon and said half sphere extending interior to the modeled object; and

construction of the representation of the swept volume further comprises bounding the swept volume at each of said current positions by said subset of polygons associated with each such position.

33) The computer system of claim 32 wherein the position matrices representing motion comprise motion data associated with a real-world object that is collected during physical experiments.

34) The computer system of claim 32 wherein each of said plurality of polygons is a triangle.

35) A computer program residing on a computer-readable medium, the program comprising instructions for causing the computer to:

generate a three dimensional polyhedral representation of a computer model of a real-world object, the representation comprising a plurality of polygons joined at their edges,

represent three dimensional motion of the modeled object with a set of position matrices,

for each of a series of sequential positions of the modeled object as represented by the matrices,

determine a subset of the edges such that each edge in said subset has a trajectory through a corresponding free neighborhood during motion of the modeled object from a current position to a next position and where each such edge's corresponding free neighborhood comprising a tangent zone comprising a region external to the material of the modeled object and bounded by a planar extension of the polygons that join at said edge,

generate traces of the motion of the subset of edges during motion between a current and a next position, and

construct a representation of the swept volume from the traces of the subset of edges.

36) A method for calculation of a swept volume of a computer generated model of a real-world object, the method comprising:

generating a two dimensional representation of the model of the real-world object, the representation comprising a plurality of edges joined at vertices;

representing two dimensional motion of the modeled object by a series of sequential positions of the modeled object in two dimensional space; and

for each position in the series of sequential positions of the modeled object,

determining a subset of the vertices such that each vertex in said subset has a trajectory through a corresponding free neighborhood during motion of the modeled object from a current position to a next position and where each such edge's corresponding free neighborhood comprising a tangent zone comprising a region external to the material of the modeled object and bounded by a planar extension of the edges that join at said vertex,

generating a trace of the motion of said subset of vertices between said current and said next positions, and

constructing a representation of the swept volume from the generated traces of the motion of said subset of vertices.

37) The method of claim 36 wherein:

for each of the position in the series of sequential positions of the modeled object, the method further comprises:

determining a subset of the edges such that each edge in said subset has a trajectory through its corresponding free neighborhood during motion of the modeled object from a preceding position to a current position and from the current position to a next position and where each such polygon's free neighborhood comprises a material zone represented by a half circle, said half circle comprising a flat face that is aligned along said edge and said half circle extending interior to the modeled object;

and wherein constructing a representation of the swept volume further comprises bounding the swept volume at each of said current positions by said subset of edges associated with each such position.

38) The method of claim 36 wherein the motion between two consecutive positions of the modeled object is modeled as linear motion.